Ahtna Engineering Services, LLC

ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES

DELTA JUNCTION TRESPASS SHOOTING RANGE BROWNFIELD REVITALIZATION
DELTA JUNCTION, ALASKA

ADEC HAZARD ID 25391
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Prepared for: Alaska Department of Environmental Conservation
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1.0 INTRODUCTION AND SITE DESCRIPTION

This Analysis of Brownfield Cleanup Alternatives (ABCA) is intended to be used as a screening tool to ensure and document that the appropriate type of cleanup is selected to address environmental contamination at the former Trespass Shooting Range (TSR) in Delta Junction, Alaska. The preferred remedial action considers site characteristics, the surrounding environment, potential future uses, community input, and cleanup goals.

The former TSR Site is located on the west side of the Richardson Highway, east of the Delta River, and north of the airstrip in Delta Junction, Alaska (Figure 1). Specifically, it is located at 145° 44’ 12.51” West, 64° 03’ 20.26” North within USGS Quadrangle “Big Delta (A-4) SE”, at Township 10 South, Range 10 East, Fairbanks Meridian. The location is along a section line easement between Sections 11 and 14. The parcel numbers are Tracts 8A, 8B, and 8C. Tract 8A encompasses 14.634 acres of undeveloped land owned by the City of Delta Junction (CDJ) since 1982. Tracts 8B and 8C encompass 21.389 acres of undeveloped land owned by the Alaska Department of Natural Resources (ADNR). North of the tracts is an operating concrete plant (Delta Concrete Products, Inc.), and south of the tracts is additional undeveloped land owned by ADNR, a portion of which is used as a biomass (tree and brush debris) drop-off center for area residents. Figure 2 shows the three tracts and surrounding lands.

The TSR Site is located on the southern portion of Tract 8A along a former access road that led to a former dump site on Tract 8B. The dump was used by area residents during the 1970s and early 1980s and was accessed by a road along the Section line leading from the Richardson Highway toward the Delta River (Figure 2). In 1982, a soil berm and cable fence were constructed across the road to block unauthorized vehicular access to the dump. The original berm was 6 feet high, and over time came to be used as the backstop (i.e., impact berm) for the TSR. In 1998 or 2000, additional measures were taken to block access to the former dump. The CDJ placed large boulders at the access road entrance along the Richardson Highway and expanded the original berm. The expansion added material on top of the old berm to raise its height to 12 feet. Another berm was added on the northern side in front of the cable fence to entirely block vehicle access.

The impact berm is U-shaped and consists of three parts: backstop berm flanked by two berm arms, one on the south (southern berm) and one on the north (northern berm) depicted on Figure 3. A mound of soil is present within the U-shape of the impact berm that is presumably comprised of soil scraped off the range floor, although this is unconfirmed and the date at which it occurred is not known[1]. In July 2018, ADNR conducted a survey of the impact berm to determine the location of the property boundaries. The northern berm is within Tract 8A on CDJ property, but the southern berm extends onto ADNR property to the south (Figure 2, Berm Area Inset). The survey also estimated the volume of soil in the entire berm at 320 bank cubic yards, with 210 bank cubic yards on CDJ property and 110 bank cubic yards on ADNR property. The impact berm is now heavily overgrown with brush, grasses, and small trees.

[1] Note that the information included in the 2018 ADEC characterization report (ADEC, 2018) stating that this range floor scraping was conducted by the Delta Junction Trails Association in 2017 is incorrect.

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2.0 PREVIOUS INVESTIGATIONS AND CLEANUPS

Trespassing at the TSR Site began in the early 1990s after the berm was initially constructed. The site summary in the Alaska Department of Environmental Conservation (ADEC) contaminated sites database states that in the mid-1990s a letter was sent to the CDJ regarding its trespass status. Signage was posted banning shooting; however, there is evidence that the berm is still used for shooting to the present day.

In 2009, the CDJ contacted the Fort Greely Environmental Manager to enquire about transferring the berm material to a military range berm. The transfer did not occur, but a volunteer effort by Alaska National Guard members was conducted in the summer of 2009 to pick up and dispose of target materials strewn around the berm and range floor areas (SLR, 2009).

The first investigation at the TSR Site was conducted in August 2009 by SLR on behalf of the ADEC's Reuse and Redevelopment Program. ADNR had identified the need for characterization of the TSR prior to upgrading the legal easement to access the Delta River. SLR visited the site and found that discarded objects such as boxes, glass bottles, television sets, microwaves, etc. were present on the range floor and had been used as targets as well as the berm. SLR cut a profile into the face of the backstop berm, and soils were examined for bullets and bullet fragments. Bullets and fragments were noted to a depth of approximately 1 foot. Spent shells and other evidence of shooting was found along the range floor. SLR also measured the entire impact berm and determined 'the munitions-impacted berm is 15 feet wide by 18 feet deep across the base'. Three (3) primary target areas were noted during the site visit, specifically at 15 yards, 30 yards, and 100 yards downrange of an old firing bench (SLR, 2009). SLR recommended completing further site characterization activities and drafted a work plan to do so; however, ADEC determined that the cost to remediate exceeded available funding, so additional characterization work was not implemented.

Additional characterization was not funded until 2016, after the CDJ and the Delta Junction Trails Association (DJTA) submitted a request to the US Environmental Protection Agency (EPA) for assessment of the area because of intended redevelopment into a recreational trails network. The EPA visited the TSR Site in 2016 as part of a Targeted Brownfields Assessment and noted similar conditions as SLR in 2009: shotgun casings were present along most of the range floor and some clay shooting targets were found on the range floor (E&E, 2018). It is believed that at some point soil was scraped off the range floor and mounded within the U-shape of the backstop berm, but the date and circumstances are not known.

In July 2017, EPA contracted Ecology and Environment (E&E) to conduct soil sampling as part of the Targeted Brownfields Assessment. E&E dug four test pits in the backstop berm and three test pits in the soil mound. Three soil samples were collected from each test pit: one from 0-6 inches below ground surface (bgs), one from 12-18 inches bgs, and one from 36-42 inches bgs (E&E, 2018). All 21 soil samples were analyzed for metals. Subsets of those samples were also analyzed for toxicity characteristic leaching procedure (TCLP, five samples) and synthetic precipitation leaching procedure (SPLP, seven samples). Sample locations are depicted on Figure 4.

In August 2018, ADEC conducted additional site characterization to support the consideration of remedial alternatives. X-ray fluorescence (XRF) screening was conducted along the southern berm and five soil samples were collected. XRF screening was also conducted on the range floor and 20 soil samples were collected in a staggered grid pattern. The backside of the backstop berm was investigated and found to contain shooting-related debris suggesting use as a target from the west, so five samples were collected. The samples were all collected from 0-6 inches bgs and were analyzed for lead, copper, antimony, and arsenic (ADEC, 2018). Sample locations are depicted on Figure 4.

3.0 CURRENT SITE CONDITIONS AND FUTURE USE

Based on visual evidence from site visits by previous investigation contractors and the ADEC, the primary sources of contamination at the TSR Site are bullets, bullet fragments, and shotgun shells. Contaminants associated with these sources are metals. Samples collected in 2017 by E&E were analyzed for 23 metals[2], but only lead, antimony, arsenic, and copper were detected at concentrations exceeding screening criteria (E&E, 2017). Samples collected in 2018 by ADEC were analyzed for lead, antimony, arsenic, and copper, and all four were found at concentrations exceeding screening criteria (ADEC, 2018). Lead is a primary compound in bullets and shot, with arsenic and antimony added for strength and roundness, and copper added as a coating or jacket.

The results from the 2017 and 2018 sampling show that soil in both the backstop berm and the soil mound contain elevated lead, antimony, arsenic, and copper. The one test pit in the northern berm only had elevated arsenic concentrations. Many of the samples collected from the range floor contained elevated lead and antimony concentrations as did two locations in the southern berm and two locations on the backside (west side) of the backstop berm. Visual evidence from the 2009 profile indicated that soil from both the original berm from 1982 and the additional berm from 1998 or 2000 are impacted and may have been mixed, suggesting that the entire berm volume is likely impacted. Test pit samples collected in 2017 from the backstop berm at three depths did not conclusively show concentrations decreasing with depth. The mound of soil (presumably scraped from the range floor) has likely been mixed and is impacted with metal contamination. Sample results are shown on Figure 4.

Although arsenic has been found at elevated concentrations at the TSA, there is evidence suggesting that it may also be naturally occurring and not solely related to shooting. If it were solely related to shooting, it would be collocated with the lead, antimony, and copper detections and not found elsewhere. However, Figure 4 shows that arsenic was detected in every sample at a concentration exceeding the cleanup level, while antimony, copper, and lead were only detected at concentrations exceeding cleanup levels at approximately 30% of the sample locations. At locations where only arsenic exceeded cleanup levels, the concentrations range from 12 to 29 mg/kg. These concentrations are consistent with background concentrations of arsenic found through the state of Alaska which range from less than 10 to 750 mg/kg (Gough et al, 1988). Therefore, arsenic not collocated with antimony, copper, and lead will be considered background and not attributed to the shooting range.

The DJTA has been working with the CDJ to develop a Delta Riverwalk Park that is envisioned to encompass much of the TSR Site, as well as the entire levee road and possibly portions of ADNR land immediately south of the TSR Site. The TSR range floor is located across two proposed trails and the impact berm is located adjacent to a proposed outdoor education shelter and amphitheater and restroom facilities (Figure 5). The next planned steps are to construct the trails, pending grant funding (ADEC, 2018).

In the future, the primary people who will be present in the vicinity of the Site are construction workers building and maintaining the trails and parking area, visitors using the trails and parking

[2] Aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc

area, and commercial workers who conduct site inspections and sanitation work. The parcel is not expected to be available for residential use, and subsistence harvesters are not expected to use the parcel.

4.0 REMEDIAL GOALS

Remedial goals for the site need to address crisis and consequence of continued use of the TSR Site as a shooting range. Crisis would occur if a user was struck by bullets or shot discharged at the berm. Consequence would occur if a user is exposed to metals contamination associated with the TSR.

The primary pathways in which humans would be exposed to the metals would be through direct contact with soil which can then be ingested (e.g. eating a sandwich with dirty hands) or inhaled (e.g. dust kicked up from wind). Metals are not able to be absorbed through the skin or vaporized to the air to be inhaled. Metals can be taken up by plants and then those plants can be ingested by humans, but this would be an insignificant exposure given the lack of plants harvested for eating on the berms and range floor. Although metals can leach into groundwater, the metals are present above the ground surface in a soil pile, and leachate would have to migrate through the soil into the ground and then down to the groundwater table located more than 20 feet bgs.[3] Similarly, precipitation runoff would have to run down the pile and then seep into the ground to reach the groundwater table. Therefore, the migration to groundwater pathway is considered insignificant.

Construction workers could interact with soil up to 15 feet bgs through digging, but recreational users and commercial workers would likely only interact with soil up to two feet bgs.

Based on the exposure pathways and the intended site reuse, the remedial goals for the TSR Site are two-fold: 1) prevent construction workers, commercial workers, and recreational users from being struck by bullets and shot discharged at the berm, and 2) prevent construction workers, commercial workers, and recreational users from unacceptable exposure to metals in the range floor and berms.

The ADEC cleanup standards presented in Chapter 75 of Title 18 of the Alaska Administrative Code (18 AAC 75) under Method Two are developed to be protective of human health (i.e., preventing unacceptable exposure) for all receptors (i.e., construction workers, commercial workers, and recreational users). Therefore, the goals for remediation are to reduce metals concentrations in soils between 0-15 feet bgs to less than the following Method Two Human Health cleanup levels.

[3] Depth to groundwater has not been measured at the Site and was estimated based on drinking water wells and groundwater monitoring wells nearby. The wells at the fire station (WELTS 32077 and 9861) have water at 74 ft bgs and 95 ft bgs, at Glacier State Telephone the well has water at 60 ft (WELTS 29470), and at Mt Hayes Community Center the well has water at 70 ft bgs (WELTS 8777). Additionally, monitoring wells at the Buffalo Service Station had groundwater at 32 ft bgs (File 120.26.010).

TABLE 1: REMEDIAL GOAL

Metal	ADEC Under 40 Inch Human Health Cleanup Level[3] (mg/kg)
Lead	400
Arsenic	8.8
Antimony	41
Copper	4,100

mg/kg = milligrams per kilogram
[3] Method Two, Table B1 Soil Cleanup Levels; ADEC 18 AAC 75, September 2018

Comparing site data to these cleanup goals indicates that the berms, the soil mound, and the range floor will require remediation to protect human health. The volume of soil in the berms and mound is 320 bank cubic yards, as surveyed in 2018 (Figure 4). The volume of soil in the range floor is estimated at 110 cubic yards, based on an estimated area 300 feet long by 20 feet wide (Figure 3) and six inches deep (based on 2018 sample results). Therefore, the total volume of soil requiring remediation is estimated at 430 bank cubic yards.

5.0 REMEDIAL ALTERNATIVES CONSIDERED

This section identifies the remediation alternatives that may be used to address the environmental contamination at the site. The "No Action Alternative" is used as the baseline against which the other alternatives are analyzed. All of the alternatives will be evaluated with respect to 18 AAC 75.

The following broad categories of evaluation criteria were considered in assembling remediation alternatives at the site:

- Overall protectiveness to public health and welfare of the environment
- Feasibility in achieving site redevelopment

The following table contains a preliminary scoping list of technologies that were considered. A discussion of the applicability of these alternatives is provided below based on our knowledge of the TSR Site at this time.

TABLE 2: PRELIMINARY TREATMENT TECHNOLOGIES

Technology Category	Treatment Technology
Engineering Controls	Capping and Signage
In Situ Treatment	Stabilization Phytoextraction
Ex Situ Treatment	Excavation and off-site disposal Excavation, stabilization, and off-site disposal Excavation, stabilization, and on-site disposal Excavation, soil washing, and disposal/re-use Excavation, phytoextraction treatment, and re-use

Engineering controls, in situ options, and ex situ options were all initially considered as remedial options for the impacted soil. However, both engineering controls and in situ options are not considered further because if the berm remains intact, shooting will likely continue, and the remedial goal of preventing humans from being struck by bullets and shot discharged at the berm will not be met. Therefore, only ex-situ treatment was considered further in this ABCA. Three of the five ex-situ alternatives were found to be reasonable to remediate the Site. The two alternatives not considered reasonable were phytoextraction and soil washing.

Although phytoextraction can be successful at treating contaminated groundwater and in treating organics in soil, it is less successful at treating metals in soils. For successful treatment, the metals must be in solution to be taken up by a plant and the plant must be a hyperaccumulating plant that will not be poisoned by the high concentrations of metals. Given the difficulty and complications of mobilizing lead from the soil, and the few hyperaccumulators that could grow successfully in Delta Junction, phytoextraction was not considered further.

Soil washing can be a successful method for segregating waste streams into the higher concentration bullet fragments and lower concentration soils. However, the volume to be treated at the Site is too small for available commercial soil washing systems to be cost effective. Companies that own soil washing equipment will not mobilize to the Site for the limited volume to treat. Therefore, soil washing was not considered further.

One primary consideration in estimating the cost of remediation is whether the metals concentrations exceed Resource Conservation and Recovery Act (RCRA) hazardous waste concentrations in 40 CFR 261.24. RCRA uses the TCLP method to assess whether the metal is hazardous by leaching into a solution. If the hazardous waste standard is exceeded, the soil must be handled as a hazardous waste, which significantly increases costs. Figure 4 shows TCLP results from 2017. Three of the five samples collected for TCLP exceeded RCRA levels for lead. Therefore, at least a portion (if not all) of the soil must be managed and disposed as hazardous waste.

TABLE 3: TCLP HAZARDOUS CONCENTRATION

Metal	TCLP Hazardous Concentration (mg/L)
Lead	5.0
Arsenic	5.0
Antimony	None
Copper	None

Source: 40 CFR 261.24, Table 1

It is worth noting that prior reports suggested that the face of the impact berm could be scraped to remove the most-contaminated soil for disposal as hazardous while the remainder of the soil (beneath the face) could be disposed of as non-hazardous. However, this approach does not appear reasonable given that the original face of the 1982 berm is now covered with a newer 1998-2000 face and the soils may have been mixed. Additionally, there is evidence that the backstop berm may have been impacted from the west and the north, creating additional impact faces.

A detailed preliminary cost estimate, including notes and assumptions, can be found attached to this document.

5.1 Option 1: No Action Alternative

No remedial activities would be implemented for this alternative. The berms and soil mound would be left intact. Neither remedial goal would be addressed, leaving the property unsuitable for re-development.

5.2 Option 2: Excavation and Off-Site Disposal

The alternative includes excavating the impact berms, soil mound, and a 6-inch lift of the range floor and transporting it off-site for disposal at an approved facility. This is the simplest alternative in that the entire bulk of material (all 430 cubic yards) is considered hazardous waste, no on-site processing or treatment is required, and it is shipped out of state for disposal at a RCRA Subtitle C disposal facility for hazardous waste. Samples would be collected from soil left in place after the excavation to confirm that the remedial goal levels have been met. The confirmation samples will be analyzed for lead, arsenic, antimony, and copper.

Costs for this option range from approximately $400,000 to 1,500,000, with a reasonable estimate of $770,000. This includes preparing the needed excavation design plans and sampling plans, receiving regulatory approval from ADEC contaminated sites program, trucking the soil from Delta Junction to Anchorage and shipping it on a barge to Seattle, and trucking it from Seattle to an approved disposal facility.

5.3 Option 3: Excavation, Stabilization, and Off-Site Disposal

This alternative is similar to Option 2, but the excavated soil will be treated prior to disposal to reduce the reduce costs of shipping and disposal of the soil as hazardous waste. The treatment would involve chemically stabilizing the metals within the soils to prevent leaching. The excavated soil would be mixed with a stabilizer such as Blastox® 215 (a calcium silicate-based product) or FESI-BOND™ (a phosphate-based product). The treated soil would be disposed in the Delta Junction landfill in coordination with the DEC Solid Waste Program. A sampling work plan will be prepared and submitted to the DEC prior to implementing the treatment program. DEC must approve the sampling plan and plan for fate and transport analysis. For this cost estimate, we have assumed that one composite sample will be collected per 10 cubic yards and analyzed for lead, antimony, copper, arsenic, TCLP lead, and TCLP arsenic. The TCLP levels will confirm that soil concentrations are less than the RCRA hazardous waste concentrations and ADEC Method Two cleanup levels (most stringent of Table B1, 18 AAC 75). Once the soil is removed, samples would be collected from soil left in place after the excavation to confirm that the remedial goal levels have been met. The confirmation samples will be analyzed for lead, arsenic, antimony, and copper.

Costs for this option range from approximately $200,000 to 775,000, with a reasonable estimate of $435,000. This includes preparing the needed excavation design plans and sampling plans, a fate and transport analysis for soil leaching, receiving regulatory approval from ADEC contaminated sites and solid waste programs, shipping stabilizer to Delta Junction from Chicago (truck to barge to truck), sampling the stabilized material and then trucking it from the Site to the Delta Junction Landfill.

5.4 Option 4: Excavation, Stabilization, and On-Site Disposal

This alternative is similar to Option 3, but the stabilized soil would be disposed on site in a monofill rather than trucked offsite to a landfill. The excavated soil would be mixed with a stabilizer such as Blastox® 215 or FESI-BOND™. The treated material will then be segregated into 10 CY piles and each pile sampled with one composite sample for lead, antimony, copper, arsenic, TCLP lead, and TCLP arsenic. Once the results indicate that TCLP levels are non-detect, and other metals levels are less than the ADEC Method Two cleanup levels (most stringent of Table B1, 18 AAC 75) the material would be placed in an on-site constructed monofill repository that would be permitted through the ADEC DEC Solid Waste Program. There are two options for the monofill: either under the proposed parking area or under a constructed geofabric cover. Both instances would meet the goal of preventing exposure to receptors and are described below.

Once the soil is removed, samples would be collected from soil left in place after the excavation to confirm that the remedial goal levels have been met. The confirmation samples will be analyzed for lead, arsenic, antimony, and copper.

5.4.1 4A: Monofill Under Proposed Parking Area

This option requires coordination with the DJTA and is complicated by unknown sources of funding and uncertain timing. For the purposes of the cost estimate, it is assumed that construction of the monofill and grading to a level gravel pad would be conducted by ADEC and the final paving and parking lot construction over the monofill would be constructed by DJTA.

Repository construction would consist of placement of a compacted 1-foot lift of 3-inch minus crushed rock base course. Treated excavated soil would be placed on this base in compacted 6-inch lifts to a height of 2 feet, over an area expected to measure approximately 4,800 square feet. To prevent human exposure to the treated soil, the repository would then be capped with a compacted 1-foot layer of 1½-inch crushed rock, followed by a compacted 6-inch layer of crushed ¾-inch minus coarse gravel. To be completed as final, DJTA would cap the repository with a 6-inch layer of asphalt.

Costs for this option range from approximately $65,000 to $265,000, with a reasonable estimate of $210,000. This includes preparing the needed excavation design plans and sampling plans, conducting a fate and transport analysis for soil leaching, receiving regulatory approval from ADEC contaminated sites and solid waste programs, shipping stabilizer to Delta Junction from Chicago (truck to barge to truck), coordinating with DTJA and DNR, preparing the subgrade for the monofill, sampling the stabilized material and placing in the monofill, and covering the material with a gravel cover. It does not include finishing the monofill as a paved parking area.

5.4.2 4B: Monofill At Site Covered by Geotextile

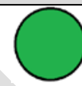
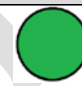
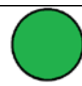
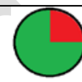
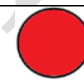
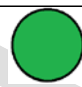
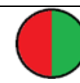
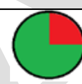
This option would require less coordination with the DJTA, and instead place the stabilized soil back in the TSA area between the proposed DJTA trails, laid in a flattened mound to prevent shooting, and covered with a geotextile fabric and soil cover to prevent exposure to humans. Above grade monofill construction would consist of placement of a 2-foot lift of treated excavated soil onto the existing grade, over an area expected to measure approximately 4,800 square feet. To prevent human exposure to the treated soil, the mound would then be capped with a geosynthetic clay liner (1/4-inch thick, such as Bentomat®), a geomembrane (20 mils, such as linear low density polyethylene [LLDPE]), a geotextile fabric (nonwoven), and then a 6-inch soil cover. The soil cover would be reseeded to blend into the surrounding landscape.

Costs for this option range from approximately $95,000 to $375,000, with a reasonable estimate of $260,000. This includes preparing the needed excavation design plans and sampling plans, conducting a fate and transport analysis for soil leaching, getting regulatory approval from ADEC contaminated sites and solid waste programs, shipping stabilizer to Delta Junction from Chicago (truck to barge to truck), coordinating with DTJA and City, sampling the stabilized material, and covering the material with a geomembrane and revegetated soil.

6.0 PREFERRED REMEDIAL ALTERNATIVES

The remedial alternatives were evaluated based on overall protectiveness to public health and welfare of the environment, and feasibility in achieving site redevelopment. We evaluated the benefits and limitations of the five alternatives with respect to effectiveness, implementability, and cost. Detailed cost tables are attached at the end of this document. A general evaluation of the alternatives considered in this ABCA is summarized in the table below. The table is structured to provide a simple graphical comparison of the benefits and limits of each alternative with respect to effectiveness, implementability, and cost; with red indicating a low ability for a remedial option to meet given criteria and green indicating a high ability for a remedial option to meet given criteria.

TABLE 5: PREFERRED REMEDIAL ALTERNATIVES

Remedial Option	Effectiveness	Implementability	ROM
1: No Action			
2: Excavation and Off-Site Disposal			
3: Excavation, Stabilization, and Off-Site Disposal			
4A: Excavation, Stabilization, and On-Site Disposal under Parking			
4B: Excavation, Stabilization, and On-Site Disposal under Geotextile			

ROM = Rough Order of Magnitude Cost

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7.0 PHOTOGRAPHS

Photo 1: Impact Berm from 50 Yards Downrange (SLR, 2009)

Photo 3: East Side Impact Berm (E&E, 2017)

Photo 2: In 2016 (E&E, 2017)

Photo 4: West Side Impact Berm (E&E, 2017)

Photo 5: Range floor samples with ADNR property boundary stakes visible at left. (ADEC, 2018)

8.0 REFERENCES

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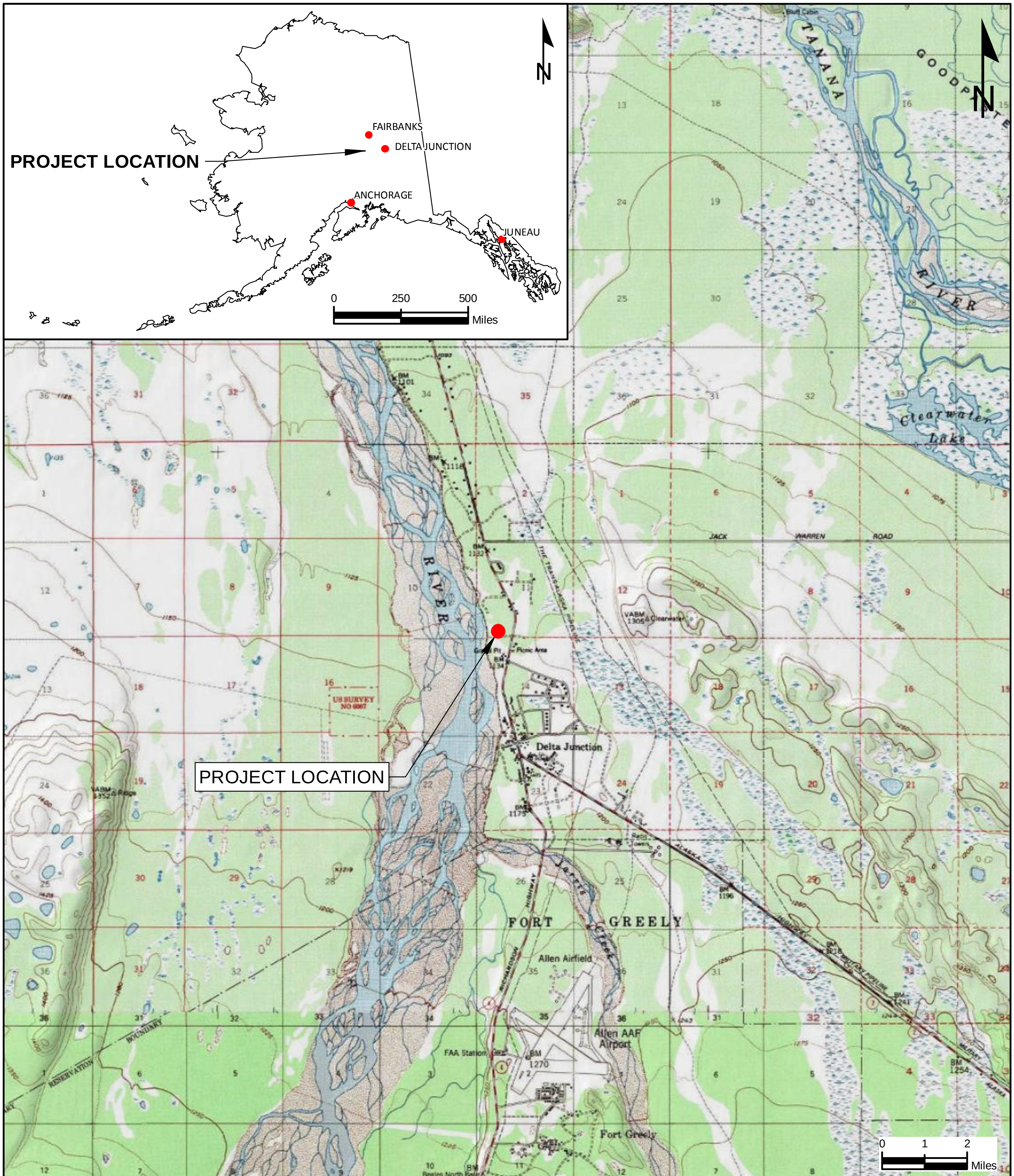
FIGURES



DELTA JUNCTION TRESPASS SHOOTING RANGE
DELTA JUNCTION, ALASKA

Ahtna Engineering Services, LLC

STATE AND SITE VICINITY

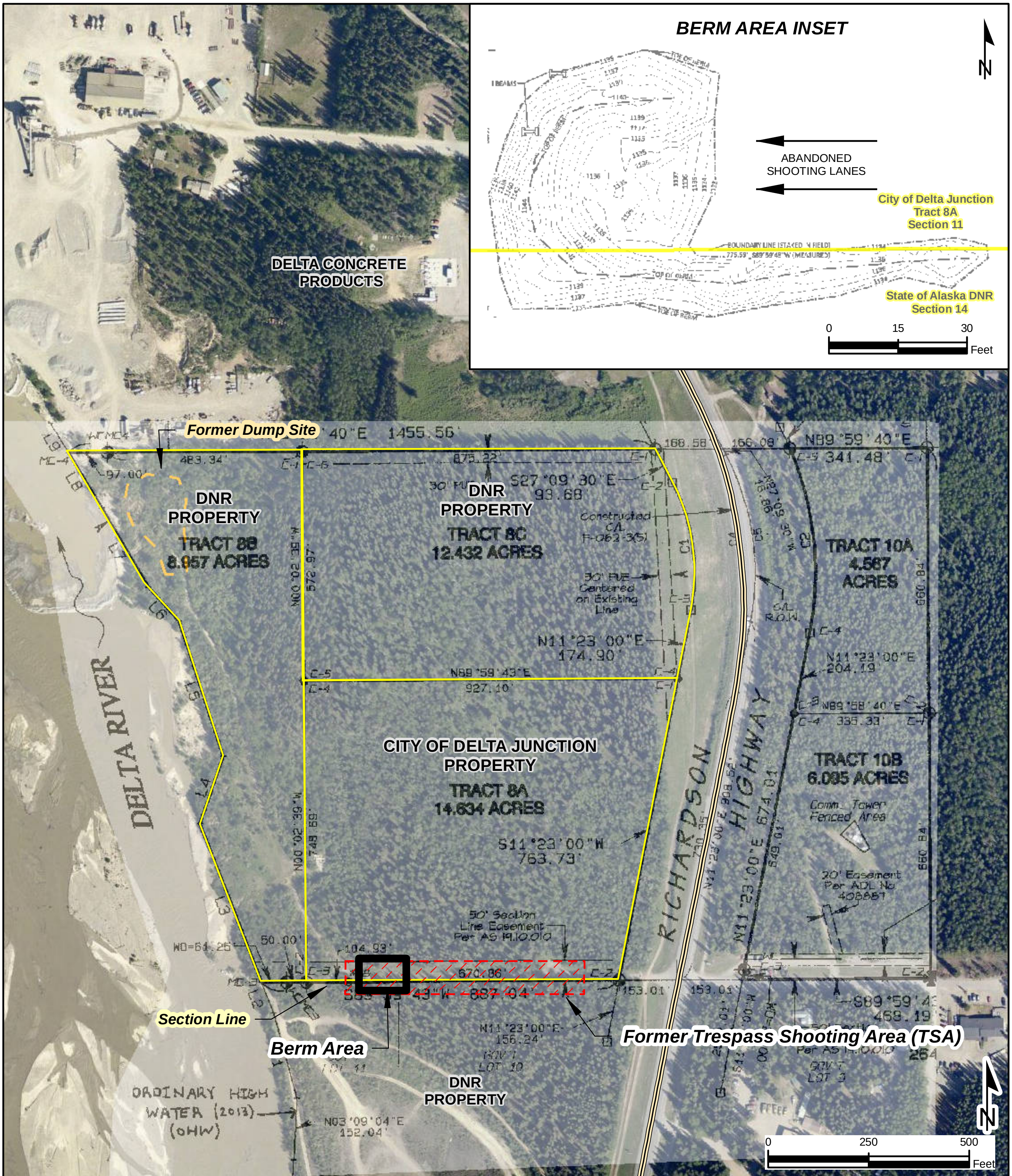
Project Number: 20301.003

Date: 12/17/2018

Drafted By: L.D.

Figure Number: 1

Prepared by ldavis, 12/17/2018; K:\Delta Junction\MXD\ABCA\Fig1_State&Site.mxd



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DELTA JUNCTION TRESPASS SHOOTING RANGE
DELTA JUNCTION, ALASKA

PROPERTY TRACTS

Ahtna Engineering Services, LLC

Project Number: 20301.003	Figure Number: 2
Date: 12/27/2018	
Drafted By: L.D.	

LEGEND

- Backtop Berm Impact Area
- Target Berm
- Shooting Lanes
- Section Line

DELTA JUNCTION TRESPASS SHOOTING RANGE
DELTA JUNCTION, ALASKA

TRESPASS SHOOTING AREA SITE

Ahtna Engineering Services, LLC

Project Number: 20301.003
Date: 12/27/2018
Drafted By: L.D.

Figure Number: **3**

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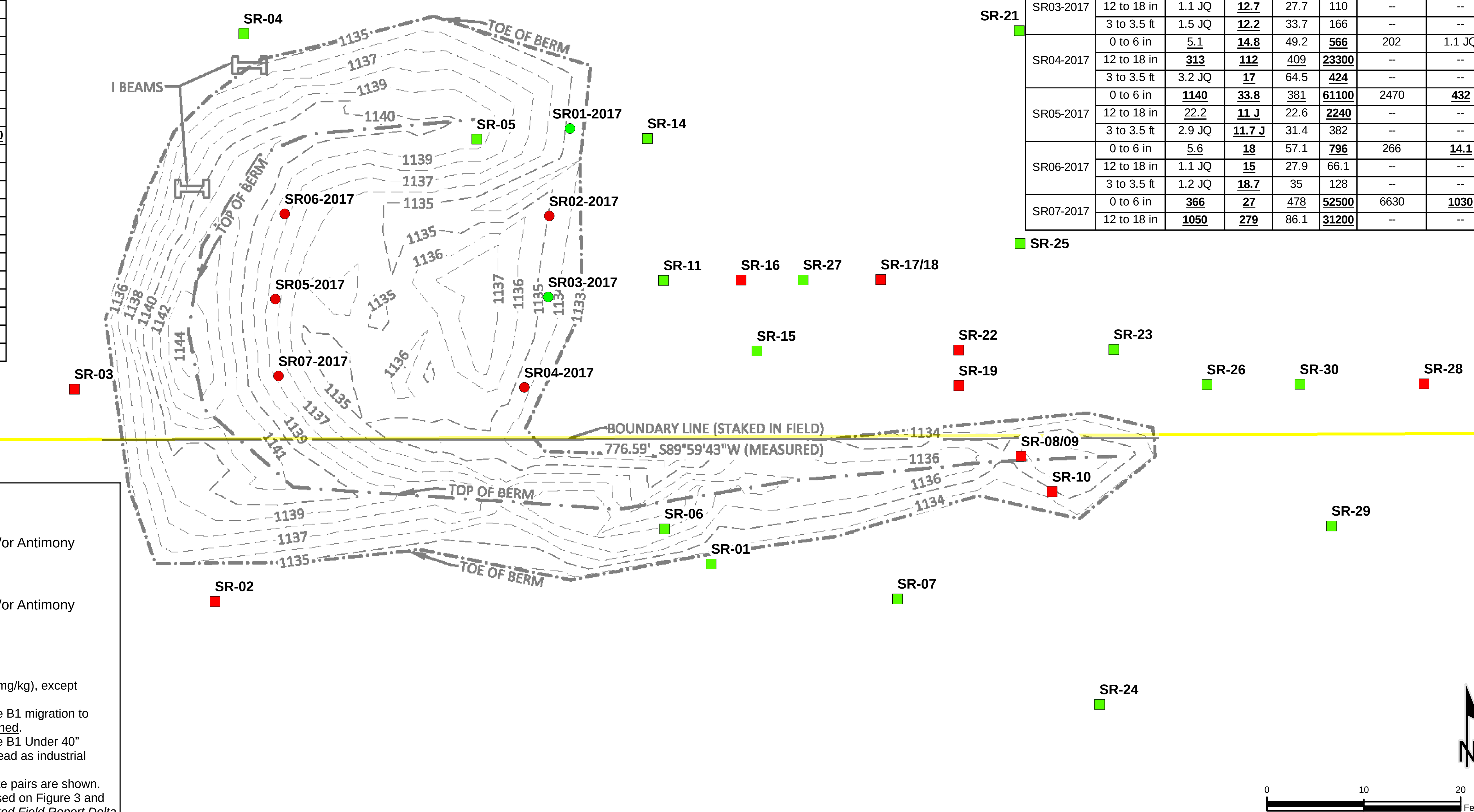
Location ID	Antimony	Arsenic	Copper	Lead
SR-01	2.4	**19**	36	140
SR-02	23	**20**	51	**2,200**
SR-03	15	**15**	53	**1,100**
SR-04	2.1	**13**	20	79
SR-05	3.1	**20**	34	240
SR-06	1.3	**18**	29	52
SR-07	1	**19**	26	20
SR-08/09	32	**22**	36	640
SR-10	6.6	**21**	33	310
SR-11	2.7	**12**	26	130
SR-12/13	2.6	**29**	36	81
SR-14	1.5	**19**	30	40
SR-15	4.3	**15**	120	240
SR-16	5.1	**17**	200	160
SR-17/18	**620**	**41**	43	**13,000**
SR-19	6	**16**	35	170
SR-20	1.8	**18**	31	27
SR-21	3.1	**15**	68	140
SR-22	40	**20**	49	**1,100**
SR-23	2	**20**	28	46
SR-24	3.4	**14**	49	97
SR-25	1.3	**12**	18	35
SR-26	1.9	**12**	23	66
SR-27	1.9	**12**	21	73
SR-28	8.5	**15**	45	370
SR-29	4	**12**	43	170
SR-30	3.2	**13**	49	130

Location ID	Depth (bgs)	Antimony	Arsenic	Copper	Lead	SPLP Lead	TLCP Lead
SR01-2017	0 to 6 in	0.63 JQ	**18.7 J**	32.9	22.4	10.3	--
	12 to 18 in	1.1 JQ	**14.5 J**	27.6	120	--	--
	3 to 3.5 ft	1 JQ	**17.1 J**	27.5	88	--	--
SR02-2017	0 to 6 in	0.9 JQ	**20 J**	37.9	46.1	17.1	0.23 JQ
	12 to 18 in	11.3	**19.8**	41.6	**890**	--	--
	3 to 3.5 ft	37.3	**11.7**	35.7	**6280**	--	--
SR03-2017	0 to 6 in	1 JQ	**22**	39.4	60.4	36.1	1.8 JQ
	12 to 18 in	1.1 JQ	**12.7**	27.7	110	--	--
	3 to 3.5 ft	1.5 JQ	**12.2**	33.7	166	--	--
SR04-2017	0 to 6 in	5.1	**14.8**	49.2	**566**	202	1.1 JQ
	12 to 18 in	**313**	**112**	409	**23300**	--	--
	3 to 3.5 ft	3.2 JQ	**17**	64.5	**424**	--	--
SR05-2017	0 to 6 in	**1140**	**33.8**	381	**61100**	2470	**432**
	12 to 18 in	22.2	**11 J**	22.6	**2240**	--	--
	3 to 3.5 ft	2.9 JQ	**11.7 J**	31.4	382	--	--
SR06-2017	0 to 6 in	5.6	**18**	57.1	**796**	266	**14.1**
	12 to 18 in	1.1 JQ	**15**	27.9	66.1	--	--
	3 to 3.5 ft	1.2 JQ	**18.7**	35	128	--	--
SR07-2017	0 to 6 in	**366**	**27**	478	**52500**	6630	**1030**
	12 to 18 in	**1050**	**279**	86.1	**31200**	--	--



LEGEND

- 2017 Sample Location
- 2017 Sample Exceeds Lead and/or Antimony Cleanup Level
- 2018 Sample Location
- 2018 Sample Exceeds Lead and/or Antimony Cleanup Level
- Section Line

NOTES:
1. All results listed in milligrams per kilogram (mg/kg), except SPLP/TCLP in milligrams per liter (mg/L).
2. Results which exceed 18 AAC 75.341, Table B1 migration to groundwater or lead as residential are underlined.
3. Results which exceed 18 AAC 75.341, Table B1 Under 40" precipitation Climate Zone Human Health or lead as industrial are **bolded and underlined**.
4. Highest value between primary and duplicate pairs are shown.
5. 2017 Sample locations are approximate based on Figure 3 and 2018 Sample locations are from Table 1, *Limited Field Report Delta Junction Trespass Shooting Range* (ADEC, 2018).
6. Topographic survey figure adapted from DNR, 2018.

SPLP = synthetic precipitation leaching procedure
TCLP = toxicity characteristic leaching procedure
JQ = result is estimated
bgs = below ground surface

Cleanup Levels (Residential/Industrial)	Antimony	Arsenic	Copper	Lead	SPLP Lead	TLCP Lead
	4.6 / 41	0.20 / 8.8	370 / 4100	400 / 800	--	5

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DELTA JUNCTION TRESPASS SHOOTING RANGE
DELTA JUNCTION, ALASKA

CHARACTERIZATION LOCATIONS AND RESULTS

Ahtna Engineering Services, LLC

Project Number: 20301.003
Date: 12/27/2018
Drafted By: L.D.

Figure Number: 4

Figure 5

north

scale: 1" = 100'-0"

0 100'

DELTA JUNCTION RIVERWALK PARK

MASTER PLAN

Delta Junction, Alaska

~~September 24, 2017~~
REVISED: May 22, 2018

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